

We Claim:

1. A fabric comprising a plurality of uncoated functional monofilaments having a grooved-shaped cross-section and having reduced air permeability compared with a fabric not having said monofilaments.

2. The fabric of claim 1 wherein a surface of each respective monofilament has a plurality of grooves formed thereon.

3. The fabric of claim 2 wherein each groove is C-shaped.

4. The fabric of claim 2 wherein each groove has an open angle less than 180 degrees.

5. The fabric of claim 1 wherein the fabric is a forming, press, dryer, TAD, pulp forming, sludge filter, chemiwasher, or engineered fabric.

6. A monofilament having a plurality of longitudinal grooves formed in its surface.

7. The monofilament of claim 6 wherein each groove is C-shaped.

8. The monofilament of claim 6 wherein each groove has an open angle less than 180 degrees.

9. The monofilament of claim 6 wherein coating adhesion is improved.

10. The monofilament of claim 6 wherein the grooved monofilament is made of a material selected from the group consisting essentially of polyester,
5 polyamide, poly(phenylene sulfide), polyetheretherketone, poly(aryl ether ketone), polyethylene, and polypropylene.

11. A fabric comprising a plurality of
10 grooved-shaped functional monofilaments and having improved adhesion to coatings compared with a fabric not having said grooved-shaped monofilaments.

12. The fabric of claim 11 wherein said fabric
15 has improved adhesion to lamination substrates mechanically interlocked by way of a flow of thermoplastic material.

13. The fabric of claim 11 wherein the
20 improved adhesion is achieved due to mechanical interlock regardless of the coating chemistry.

14. The fabric of claim 11 wherein the
25 improved adhesion is achieved by an interlocking mechanism between the coating and the yarns in the fabric.

15. The fabric of claim 11 wherein the fabric
30 is a forming, press, dryer, TAD, or engineered fabric.

16. A bicomponent monofilament made from a coated grooved-shaped monofilament.

5 17. The bicomponent monofilament of claim 16 having improved delamination resistance due to the mechanical interlock between the coating and grooves compared with a bicomponent monofilament not made from a coated grooved-shaped monofilament.

10 18. The bicomponent monofilament of claim 16 wherein the bicomponent monofilament is made using solution coating.

15 19. The bicomponent monofilament of claim 16 wherein the bicomponent monofilament is made using wire coating.

20 20. The bicomponent monofilament of claim 16 wherein said bicomponent monofilament has a conductive coating.

25 21. A die used for extruding groove-shaped monofilaments and having a capillary cross section with a plurality of projections oriented towards an interior of the capillary, wherein an angle centering at the origin of a respective projection and facing into said interior is over 250 degrees, and the open angle defined as the angle centering at the origin of a C and facing its outlet is much less
30 than 180 degrees.

22. The die of claim 21 wherein a diameter of the capillary is approximately three times the size of the monofilaments to be produced.

5 23. The die of claim 21 wherein the ratio of length to diameter of the capillary is approximately 3:1.

10 24. The die of claim 21 wherein the monofilaments to be produced are made of PET.

15 25. The die of claim 21 wherein the monofilaments are extruded according to a melt spinning process.

20 26. A monofilament having one or more grooves, said grooved monofilament having improved adhesion to coatings compared with a round ungrooved monofilament and provides for improved air handling.

25 27. The monofilament of claim 26 wherein the groove's cross sectional shape is one of U-shaped, key-way shaped, C-shaped, V-shaped, square, rectangular, or trapezoidal.

30 28. The monofilament of claim 26 wherein the monofilament is square or rectangular in shape with a top surface of the monofilament having the same profile as a bottom surface.

29. The monofilament of claim 26 wherein the monofilament is square or rectangular in shape with

a top surface having a different profile than a bottom surface.

5 30. The monofilament of claim 29 wherein the groove(s) formed in the top surface are offset from the groove(s) formed in the bottom surface.

10 31. The monofilament of claim 28 wherein groove(s) formed in the top surface are aligned with groove(s) formed in the bottom surface.

15 32. The monofilament of claim 26 wherein the improved adhesion is achieved due to mechanical interlock regardless of the coating chemistry.

 33. The monofilament of claim 26 wherein the improved adhesion is achieved by an interlocking mechanism between the coating and monofilaments.

20 34. The monofilament of claim 26 wherein the grooved monofilament is made from one of polyester, polyamide, poly(phenylene sulfide), polyetheretherketone, poly(aryl ether ketone), polyethylene, polypropylene and metal.

25 35. The monofilament of claim 26 wherein the grooved monofilament is made by die extrusion.

30 36. A fabric comprising a plurality of monofilaments, said monofilaments having one or more longitudinal grooves, said fabric exhibiting

improved air handling compared with a fabric not having said monofilaments.

5 37. The fabric of claim 36 wherein the grooves in the monofilaments channel air passing over the fabric.

10 38. The fabric of claim 36 wherein the grooves in the monofilaments increase a void volume of the fabric without increasing the fabric's caliper.

15 39. The fabric of claim 36 wherein the cross sectional shape of the grooves in the monofilaments is one which provides the fabric with an air handling capacity.

20 40. The fabric of claim 36, wherein the grooved monofilaments are incorporated as both MD yarns and CD yarns, said fabric exhibiting a thinner caliper, reduced permeability, greater stability, improved sheet contact, and reduced dusting, as compared with a fabric not having said configuration.

25 41. The fabric of claim 36 wherein said grooves in the monofilaments provide venting of moisture at a point of contact between the monofilaments and a sheet on the fabric.

30 42. The fabric of claim 36 wherein the fabric is a forming, press, dryer, TAD, pulp forming, sludge filter, chemiwasher, or engineered fabric.

43. The fabric of claim 36 wherein the groove's cross sectional shape is one of a U-shaped, key-way shaped, C-shaped, V-shaped, square, rectangular, or trapezoidal.

44. The fabric of claim 36 wherein the monofilament is square or rectangular in shape with a top surface of the monofilament having the same profile as a bottom surface.

45. The fabric of claim 36 wherein the monofilament is square or rectangular in shape with a top surface having a different profile than a bottom surface.

46. The fabric of claim 45 wherein the groove(s) formed in the top surface of the monofilaments are offset from the groove(s) formed in the bottom surface of the monofilaments.

47. The fabric of claim 44 wherein groove(s) formed in the top surface of the monofilaments are aligned with groove(s) formed in the bottom surface of the monofilaments.

48. The fabric of claim 36 wherein the grooved monofilament is made from one of polyester, polyamide, poly(phenylene sulfide), polyetheretherketone, poly(aryl ether ketone), polyethylene, polypropylene and metal.

49. The fabric of claim 36 wherein the grooved monofilament is made by die extrusion.

5 50. The monofilament of claim 26 wherein the monofilament is square or rectangular in shape with a top surface of the monofilament having at least three key-way shaped grooves therein.

10 51. The monofilament of claim 50 wherein said monofilament is less likely to mark a sheet than a monofilament not having said configuration.

15 52. A filament comprised of a core surrounded by a grooved sheath, the core and the sheath being distinguishable from one another by their differing color, wherein a color change of a fabric comprising said filaments indicates wear thereof.